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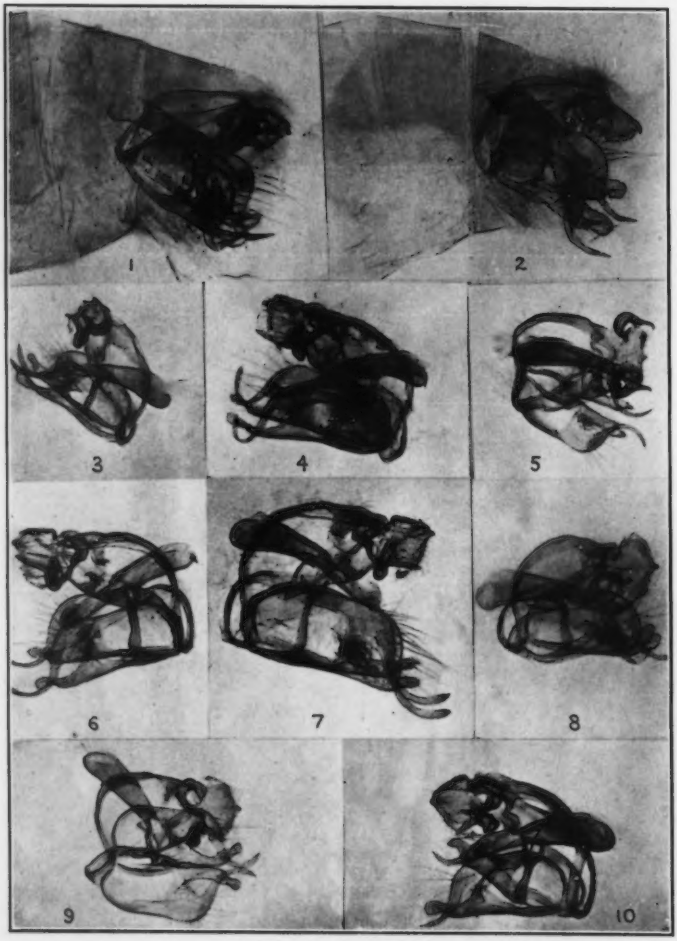

1. EVERES ARGIADES; 2. E. CORETAS; 3-5. E. COMYNTAS; 6-10. E. AMYNTULA.
BETHUNE-BAKER.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

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Everes comyntas and amyntula (Lepid.).

By G. T. BETHUNE-BAKER, Edgbaston, Birmingham, England.

(Plate V)

A few years ago, when the late J. W. Tutt was preparing his history of *Everes argiades* for his work *British Lepidoptera,* he asked me for my views on the species and its allies. This involved an intricate correspondence with my friend and also with Dr. Chapman, who was likewise working at the species with the same object. It led, later on, to considerable research as to the Eastern forms of the genus and in like manner to those from the far West. In this paper I propose to consider these latter only, inasmuch as the questions arising among the Indian and Chinese species do not enter into the relationship of *comyntas* and its allies. Primarily my best thanks are due to Mr. W. P. Comstock, of New York, who has taken great trouble and care in elucidating the number of broods in that area and in giving me a bibliographical list of the species

here enumerated. I have also to thank Mr. W. W. Newcomer and many others who have liberally given me specimens from all parts of North America, so that I now have in my collection over 600 specimens from different parts of that continent and have examined at least a couple of hundred in other collections.

Careful examination and comparison reveal variations occurring in American forms on much the same lines as obtain in European forms, but we have, however, none of the beautiful blue females that are fairly frequent in America. The dull blue of our *polysperchon* is so dull and of such restricted area that it does not at all approach to the bright and large suffusions of *comyntas* or the almost entirely blue females that are apparently the prevalent form in Southern California. Mr. N. Criddle sent me some specimens of *amyntula* from Aweme, Manitoba, which approximate somewhat closely to the Austro-Hungarian and Balkan *decolorata* Stgr. on the upper side, but the under side is quite different. In both the American insects the size varies very considerably, quiet as much—nay more—in the apparently single-brooded *amyntula* than in the many-brooded *comyntas*.

It may be well now to treat with the species individually, but in so doing I would say I do not propose to deal with all the literature, but rather to consider the species in relation to each other.

Everes comyntas Godart.

Everes comyntas Scudd., Syst. Rev., p. 35 (1872); Buff. Bull. iii, p. 114 (1876); Butts, pp. 130, 152, 308, fig. 125 (1881); Butts, New Eng., ii, p. 911, pl. VI, ff. 9 and 10 (1889); Brief Guide, p. 123 (1893). Staudinger and Rebel, p. 77 (1901). Dyar List, Bull. U. S. N. M., p. 45 (1902). Tutt. Brit. Butt., III, p. 72 (1909).

Lycaena comyntas Doubleday, List Lep. B. M., ii, p. 43 (1847). Edwards, Can. Ent., viii, p. 202 (1876). Middl., Lep. Ins. Ill., x, p. 95 (1881). Fernald, Butts. Maine, p. 91, f. 32 (1884). Edwards, Cat. N. Am. Butt., p. 65 (1884). French, Butts. E. Un. States, p. 292 (1886). Maynard, Butts. New Eng., p. 40, pl. V, ff. 50, 50a (1886). Godm. and Salv., Biol. C. Am. Rhop., ii, p. 108 (1887). Ckll., Trans. Am. Ent. Soc., xx, p. 355 (1893). Grant, Can. Ent., xxix, p. 208 (1897). Williams, Can. Ent., xxxv, p. 187 (1903).

Polyommatus comyntas Godart, Enc. Meth., ix, pp. 607 and 660. Latreille, l. c., 608 (1819). Durban, Can. Nat., v, p. 246 (1860). Morris, Syn. Lep. N. Am., p. 83 (1862). Harris, Ins. Inj. Veg., 3d ed., p. 275 (1862); Entom. Corresp., p. 275 (1869). Aar., Can. Ent., ix, p. 200 (1877).

Argus. Bdv. and LeConte, Lep. Am. Sept., p. 120, pl. 36, ff. 6-9 (1833).

Comyntas. Strecker, Lep. Rhop. Het., p. 82 (1874). Mead, Wheeler's Rep., v, p. 783 (1875). Strecker, Cat. N. Am. Macrolep., p. 92 (1878). Packard, Guide, p. 265 (1874). Pilate, Papilio, ii, p. 66 (1882). Beutenmüller, Des. Cat. Butt., p. 284 (1893). Skinner, N. Am. Rhop., p. 59 (1898). Holland, Butt. Book, p. 268 (1898). Smith, Ins. N. J., 2d ed., p. 376 (1899). Beutenmüller, Butt. Vic. N. Y., p. 36 (1902). Smith, Ins. N. J., 3d ed., p. 416 (1909).

Plebeius. Kirby, Syn. Cat., p. 653 (1871).

The variations of the upper side consist chiefly in the width of the blackish termen and in the amount of orange color at the anal angle of the secondaries. I have before me specimens in which the margin is almost linear, whilst in one from St. Louis, Mo., it is nearly 3 mm. wide and there are gradations through from the one to the other; in that same specimen also (from St. Louis) the orange spot, or rather two spots, at the anal angle are larger than in any other male specimen. The spotting of the under side is very constant, especially in the primaries. I have only one or two that show any obsoletion; in those cases the costal and the third spot in the macular transverse band are almost absent. In one the costal spot has quite disappeared; in the secondaries this characteristic is less rare, the spot below the second costal spot is not infrequently absent or obsolescent, whilst the third spot in the curved macular row, below the one just mentioned, is also affected in a like manner. In only one specimen do I find a nearly complete obsolescence, viz., one sent by Mr. Newcomb from Oakland, Michigan. In this the two bottom spots in the transverse macular row are present in the primaries, and in addition to this a very minute spot is visible between veins 5 and 6 on the right wing only; in the secondaries the basal and outer spot are present but very small, whilst there is a minute spot visible on the inner margin of the left wing, and the dashes closing the cells are visible but fine.

The usual form of the female, so far as my specimens go, is brown from the Eastern States, with very occasional touches of blue from St. Louis. I have three decidedly blue specimens out of about two dozen, which (blue) form increases as we go westwards until in New Mexico it appears to be the typical form. I have a very long series from Fort Wingate (Coll. Woodgate), but have not got one entirely brown female, all with one exception showing a large suffusion of blue. These were sent over to England as *amyntula,* but there is no doubt that they are *comyntas,* though they are larger than the Eastern specimens of that insect. I regret to say I have seen no females from Mount Shasta, where *comyntas* and *amyntula* are reported as flying together. I have examined a few males of the former species from that district which are without doubt *comyntas.* From Canada I regret that I have not sufficient material to form any conclusions on; from Halifax, N. S., the females are brown.

There appears to be little doubt that in the New York district the species has four broods. Mr. W. P. Comstock has taken a great amount of trouble to work out this subject for me. Here I give the records that he has kindly furnished me with, which refer to his observations for the year 1909, it being in the early part of that year that our correspondence commenced.

"*First brood* occurring at Jamesburg, N. J.

"May 8th I took four males and one female, all quite fresh.

"May 17th, nine males and three females, which latter were used for breeding, all being still fresh.

"May 24th, twelve males, but no female, seen; most were a little worn.

"May 30th, only two males were seen.

"June marks a distinct period between the first and second broods, no specimens being seen at Jamesburg.

"*Second brood.*—July 4th a quite fresh male and female were taken, also a larva in its first stage.

"Second brood taken at Newark, N. J.

"July 5th, the species was fairly thick, all fresh specimens.

"July 25th I took five males and three females, some much worn, only one fresh, which was probably a forward of the third brood.

"*Third brood.*—On July 24th I bred specimens from larvae taken at Jamesburg during the first week in July.

"August. The species is on the wing during the whole of this moult.

"September. Not infrequent through the greater part of this month also. On the 25th of September I found larvae nearly fed up, whilst on the 7th and 31st of October I found a pupa of it."

I have before me Mr. Comstock's records of the species from 1899 to 1908, from which it is evident that, with the exception of the month of June, it is on the wing in the New York district and within a radius of fifty miles from the centre of that city from early May till the middle of September. In June he took a single specimen twice, only once in 1899 on June 25th at Van Courtlandt Park, New York City, and one on June 21st at Jamesburg in 1908. It appears, therefore, that there are four broods, the first and second with a distinct interval, viz., the month of June, whilst with the second, third and fourth there may be overlapping. It is not unlikely that the fourth brood may be only a partial one.

I have a long series all dated from St. Louis, Mo., where they appear on the wing earlier in the year, viz., April 17th. On this date I have four males and one female. In this locality the interval between the first and second brood appears to be in the latter part of May and the early part of June, for on and after June 14, 1909, it was regularly on the wing to the end of July. I have no specimens taken in August, but several in September, the latest date being September 16, 1909.

Mr. Frost sent me a nice series from Framingham, Mass., all dated, where it occurs plentifully in July and August. No doubt it also occurs earlier, but I wrote to that gentleman late in the year.

From Michigan (Oakland County) the dates are similar to the New York district, but the females are peculiar, being sooty black with a limited suffusion of deep but brightish blue scales.

From New Mexico (Fort Wingate, Woodgate Coll.) my specimens, a long series, start on the seventh of May, are on the wing regularly throughout June and, I understand, also in July and August. It is interesting that this is the only locality that I can trace where there is no interval between the first and second broods.

Other localities that I am aware of from my own and other collections, including the British Museum, are: North Carolina, Nevada, Maine, Pennsylvania, Florida, Colorado, Arizona, Oregon, Oklahoma, Sonoma Co., San Bernardino and Shasta (Cal.), Texas, Vera Cruz, Orizaba, Polochic Valley, Guatemala, British Honduras, Nicaragua. All the females from the last half-dozen localities are suffused with blue, whilst a characteristic of the Californian males is that they have quite narrow black borders.

The larva (*teste* Comstock) is highly variable in color—red brown, violet brown or yellow brown—as a rule, but he has had them green, also red brown striped with green. Generally they are speckled with lighter, from which the hairs spring. On July 4, 1908, he found fifty eggs on *Desmodium* (? sp.) at Monmouth Junction, N. J., which duly hatched and fed up well on red clover flower heads. The first imago appeared on July 27th. August 2d more eggs were easily found on the same species of plant at Snake Hill, N. J. On September 7th both ova and larvae were found at Dennisville, N. J., on *Lespedeza hirta,* and on the 16th of the same month forty larvae and a few unhatched ova were found on the same species of plant at Andover, N. J. All these larvae hibernated, but all died; my friend tells me he had thought that on account of their small size they were not full fed and he expected them to feed up in the spring. The probability seems to me that in a very favorable October there may be a partial fifth brood (this I say from the fact that Mr. Comstock found two pupae in that month), but that in ordinary seasons the larvae feed up fully in the autumn, hibernate in this stage and complete their metamorphosis in the spring.

Habits of the perfect insect.—Mr. Frost considers it is a species easily frightened, in which case it will suddenly drop to the earth and will crawl down almost into the roots of the grass: they often indulge, however, in play or quarrels, when they will frequently mount into the air to a considerable height.

Genitalia.—These prove conclusively in my judgment that the species is a form of *coretas,* not of *argiades.* I regard these as distinct species

on account of the differences in the genitalia—differences which appear to be constant. In *argiades* the aedoeagus is slender and of almost uniform width till quite close to the extremity; in *coretas* it is quite broad at the base, gradually tapering for two-thirds of its length, when it suddenly narrows and is fairly even to the apex; the clasps are heavier made, the upper curved hook-like extremity being stouter, shorter, and the curve much sharper in *argiades* than in *coretas;* the tegumen also differs, in *argiades* the central point, though sharp, is not elongate as in *coretas,* but more triangular, as it were, and from the central point the sides of the tegumen gradually slope off evenly, but in *coretas* they are quite distinctly shouldered, the latter species being less copiously and more finely haired in this region than in *argiades;* the falces or hooks of this region are more slender than is the case in the latter species (*argiades*).

In *comyntas* all these points are strongly emphasized. The aedoeagus is very decidedly stouter at the base, tapers more rapidly, but for a shorter distance, being only for a little more than half the whole length. The hooks of the clasp are longer and finer than even in *coretas,* whilst the softer lower somewhat spatulate and folded extremity of the clasp is proportionately longer than in *coretas,* but slenderer, thus in this one particular being rather nearer *argiades.* The tegumen is even squarer and more shouldered than in *coretas* and the falces are longer also; the fulcrum, or support for the aedoeagus, has a long stem and is placed near the middle of the clasp in this genus, but in *comyntas* its bifid arms are decidedly shorter than in either of the European species.

I started this investigation under the impression that the American species was *argiades* pure and simple. My final conclusion is that it is now a distinct species from either *coretas* or *argiades,* the markings and pattern are nearer the latter, but the genitalia have developed in the direction of *coretas* and have gone well beyond that species.

(To be continued)

Method of Breeding Lycaenidae (Lepid.)

I have had great success this past season in breeding Lycaenidae. By placing gravid females in glass-covered boxes, which were then placed in the sunlight, I induced practically every female so exposed to oviposit. Care should be taken that the sun's rays are not too intense. In this way I obtained ova of *Lycaena sonorensis, battoides, acmon, polyphemus, exilis, Chrys. arota* and *Thecla dumetorum.*—Karl R. Coolidge.

The Origin of the Oligotropic Habit among Bees (Hymen.).

By JOHN H. LOVELL, Waldoboro, Maine.

In the December, 1912, number of ENTOMOLOGICAL NEWS, Mr. Charles Robertson offers a number of criticisms on my treatment of oligotropic bees in the *Popular Science Monthly* for August, 1912. It should be premised that the paper was a popular presentation of the subject, from which unnecessary technicalities were omitted. In one or two instances Mr. Robertson gives the obvious meaning of the writer and then suggests an alternative view, from which he proceeds to differ; there would appear to be an evident desire to provide material for criticism. There was no intention on the writer's part of attributing the definitions of oligotropic and polytropic bees, which were given in the modified forms suggested by Mr. Robertson in 1899, to Dr. Loew. For the benefit of those not familiar with the literal meaning of these words it was stated that they signified adapted to few or to many flowers and originated with or were proposed by Loew.

Mr. Robertson says that *Epeolus* is a genus of inquilines. Formerly he asserted the contrary. In the *Bot. Gaz.*, 28:35, he said: "I have never believed that our species of *Epeolus* were cuckoos of *Colletes,* because there are more common species of the former than of the latter genus, and their phenological positions do not show the correlations which exist between *Andrena* and *Nomada, Megachile* and *Coelioxys.* Besides the maximum of *Epeolus* does not approximate that of any other genus of bees on which it might be supposed to be inquiline. Then they are more abundant than would be expected of inquiline bees. Mr. Ashmead's observations confirmed my views, and I have never doubted their correctness since I first read an account of them. In *Psyche* for March, 1894, p. 41, he states that he found *E. donatus* making nests in the ground and provisioning them with honey paste. *Epeolus* thus comes under the same category as *Prosopis* and is treated the same way in the table." Mr. Robertson is here positive

that *Epeolus* is not a parasitic genus, and expresses an entire absence of doubt as to the correctness of this conclusion. Dr. Graenicher has shown (*Bull. Wis. Nat. Hist. Soc.*, 3: 164) that *Triepeolus helianthi* is an inquiline of *Melissodes trinodis*. In 1910 Prof. Cockerell in "An Introduction to the Study of Rocky Mountain Bees" (*Univ. Col. Studies*, 7: 183) described *Triepeolus* Rob. as a parasitic genus, but *Epeolus sens str.* is not thus characterized. In this locality I have never taken either sex of *Triepeolus donatus* except on the flowers of the Compositae. It can not be competition for pollen which leads this species and one or two others of the same genus to visit exclusively the inflorescence of this family. Evidently it is the attractiveness of the flowers.

In Southern Maine both sexes of *Halictoides novae-angliae* year after year visit exclusively the flowers of the pickerel weed; and I, therefore, call the species monotropic in this locality. Because in another region, where the pickerel weed is absent, it visits other flowers, Robertson would not regard it as monotropic anywhere. This is a matter of definition in which we differ. If a bee in a certain region visits only one species of flower for pollen I would consider it monotropic in that area, and I believe that this usage should prevail. It seems probable that any oligotropic bee, which extends into a region where the flowers it habitually visits elsewhere do not occur, will resort to other flowers. Robertson would seem formerly to have held a similar opinion for he says (*Bot. Gaz.*, 28:34), "When the flowers upon which a bee depends become extinct or rare, the bee may disappear or be forced to resort to flowers which originally it did not visit."

I am aware of the so-called analogy presented by other groups of organisms to oligotropism; and in my article mentioned certain Lepidoptera and Coleoptera, which live on a single plant species both in the larval and adult stages; yet the oligotropic habit does not appear so obvious to me as to Robertson. The honey bee, bumble bees and many other bees visit a great variety of flowers and the natural expectation would be that all bees are polytropic. Certainly this is what most

persons do suppose. Oligotropism could not have been self-evident to Hermann Müller or he would not have written (*Fertilization of Plants*, p. 570): "In general anthophilous insects are not limited by hereditary instinct to certain flowers, but they wander about getting their food on whatever flowers they find it." etc.

In the paragraph beginning with the sentence, "The oligotropic habit is not beneficial to flowers, it concerns the bees alone," oligotropism is stated to have arisen independently of any benefit received by the flowers and solely because it is an advantage to the bees. It would seem that no one could be misled by the paragraph as a whole, except perhaps an over-willing critic. I can hardly believe that Robertson supposed that I intended to deny the value of "flower fidelity" to flowers. Personally, I believe that flower fidelity on the part of bees is an advantage to flowers, as I stated later in my article and as Robertson noticed; though the advantages of cross-pollination are questioned by some ecologists. The writer distinguishes between oligotropism and flower fidelity. The oligotropic habit is flower fidelity carried to the extreme. Polytropic bees also possess flower fidelity. It would not be an advantage to a flora for all the bees to be oligotropic, since then many entomophilous flowers would not be visited by these most important agents in pollination. The time of flight of many polytropic bees would necessarily be greatly reduced, which would clearly be a great disadvantage. I know of no native flower which is wholly dependent for pollination on an oligotropic bee; usually the flowers are visited by many other bees and the oligotropic bee may be comparatively rare and unimportant. *Andrena solidaginis* is so rare in this locality as to be of no significance in the pollination of *Solidago*. It is sufficient if a flower is effectively pollinated, and repeated visits may be and often are useless. Therefore the entomophilous flora of a region, as a whole, is not better pollinated because a part of the bees are oligotropic than it would be if they were all polytropic.

How has the oligotropic habit originated? Mr. Robertson

believes that it is the result of an effort on the part of the different species of bees to avoid competition. I hold that it has arisen because of the direct advantage gained coupled with a short term of flight.

While the white clover is in bloom in the Eastern States the honey bee visits the flowers almost exclusively for nectar and pollen. There is here no question of competition; primarily the bees come to procure the great abundance of nectar found in the clover heads, and pollen is gathered from the same flowers as a matter of convenience. If the honey bee flew only while the white clover was in bloom it would be regarded as a monotropic visitor of this plant; but as it flies throughout a large part of the year and requires ample stores it can never become oligotropic. In California for a time honey bees gather nectar wholly from the sages; in Michigan from the raspberry or willow herb; in the Central States from the basswood; in New York from buckwheat, and in Maine in the fall they obtain both pollen and nectar largely from the golden rods. The correlation existing between the domestic bee and various flowers affords an ever-present illustration of the way in which the oligotropic habit might arise in the case of a bee with a short term of flight.

There can be no competition where there is an over-abundance of supplies. No other early blooming entomophilous flowers yield so much pollen and nectar as the willows. No other genus of honey plants in early spring is so valuable to the apiarist as *Salix*. The honey bees gather great quantities of pollen, and in some localities they are reported as storing from 8 to 15 pounds of honey per hive from this source alone. The remarkable fitness of the willows to the needs of Andrenid bees has been observed by Mr. C. M. Weed (*Ten New England Blossoms*, p. 9), who remarks upon the great abundance of pollen and nectar and the absence of any equally attractive flowers. In a paper on "The Relations of the Andrenine Bees to the Entomophilous Flora of Milwaukee County" (*Trans. Wis. Ac. Nat. Sciences*, Vol. 15), Dr. Graenicher has given a list of the 47 species of *Andrena* occurring in that locality

with their time of flight and the flowers they visit for pollen. No species of *Andrena* has ever been seen in spring before the willows blossom, "although two species of entomophilous plants *Erigenia bulbosa* and *Hepatica acuta* open up their flowers earlier than this willow" (*Salix discolor*). The two species which first appear fly for about a month, and are both oligotropic visitors of *Salix*. At the beginning of their flight they are, of course, exposed to no competition whatever from other species of *Andrena*. From March 31st to April 28th ten species of *Andrena* appear successively, of which four are oligotropic visitors of *Salix* with an average time of flight of about 44 days. Six species are polytropic, but they all obtain a part of their pollen from the willows; in Maine they are often present in large numbers so that the oligotropic species would not escape competition with them if there was a scarcity of pollen. Their average time of flight is about 63 days, or 43 per cent. longer than that of the oligotropic species, which greatly increases the probability, or may render it necessary, that they obtain a part of their pollen from other flowers than those of *Salix*. Common and widely distributed species, like *A. vicina*, which flies for about two months, doubtless often find it more convenient to gather pollen from flowers which are nearer their nests.

Certain species of *Andrena* visit the willows exclusively because during their comparatively short time of flight they can readily obtain all the pollen and nectar they require, and there is no occasion for them to go elsewhere. But they do not thus, as has been shown, escape the presence of the polytropic species, which are frequently very common. Of the four species of *Andrena* oligotropic to *Salix* in Maine only one is common, *A. illinoensis*, a small bee, not likely to fly far. The oligotropic *A. mariae* is comparatively rare, while the polytropic *A. weedi* Vier. and *A. hippotes* Rob. are very common on the willow aments; it sounds, therefore, somewhat paradoxical to say that the former escapes competition with the polytropic forms because of their absence. It is because of the great abundance of pollen and nectar that there is no

competition with the polytropic bees severe enough to force the oligotropic species to go elsewhere.

The maximum of species of *Andrena* on the wing at one time in Milwaukee County, Wis., says Dr. Graenicher, is reached in the latter part of May and lasts throughout the first week of June. Various common shrubs, which produce their flowers in great profusion are then in bloom, as *Viburnum, Crataegus, Cornus, Ribes* and *Rubus,* besides a great abundance of umbelliferous flowers. This maximum, therefore, "corresponds with the blooming period of a great variety of flowers, representing different families." The majority of the species of *Andrena,* or 17, are polytropic, as the character of the flora would make probable. Seven species are oligotropic, two getting their pollen from the late blooming willows, one from the strawberry, a very common and widely distributed plant; one from *Geranium maculatum,* and two from the very abundant flowers of *Thaspium trifoliatum aureum* and *Taenidia integerrima,* two species of Umbelliferae. As in the case of the willows the flowers of the two last named plants are visited by many polytropic bees. The oligotropic species, then, visit very common flowers, which are in bloom during the entire time of their flight, and which produce pollen and nectar in quantities sufficiently large to prevent injurious competition between them and the many polytropic bees which visit the same flowers.

The seventh species (*A. geranii*) in Milwaukee County gets its pollen from *Hydrophyllum,* but at Carlinville, Ill., according to Robertson, it also gathers pollen from *Blephilia ciliata.* Observations on the visits of the various species of *Andrena* are far too few in number. Robertson says that he has observed 595 visits of 51 species. This is only 11.6 visits for each species. A large number of observations from many localities is very desirable, and might modify our ideas on the constancy of oligotropic bees.

The evidence against oligotropism being an effort on the part of bees to avoid competition for pollen becomes much stronger when we consider the summer and autumnal species

of *Andrena*. In Milwaukee County, Wis., according to Graenicher, there are then 11 species of *Andrena* on the wing; and all of them, with one exception, are oligotropic visitors of the Compositae. The single exception (*A. parnassiae*) is found only near Whitefish Bay, Lake Michigan, where *Parnassia caroliniana* produces a great abundance of flowers. Evidently this bee gets its pollen from these flowers because they are very abundant in the one locality where it is known. As stated above all the other species, ten in number, are oligotropic to the Compositae. Many genera of this family are excessively common, as the golden rods, asters, sunflowers and thoroughworts, and yield immense quantities of nectar and pollen. There are very strong inducements for these bees to visit these flowers, and comparatively little for them to go elsewhere. These oligotropic species of *Andrena* cannot visit the Compositae to avoid competition with other species of the same genus because there are no other species flying. Nor can they receive any benefit from other species visiting the flowers of other families for the same reason—the entire absence of such Andrenid bees. There is but one explanation possible, and that is that they visit the Compositae exclusively for the direct advantages thus obtained.

This point is still further illustrated by four autumnal species of *Andrena*, which in New England restrict their visits chiefly to the golden rods. The various species of *Solidago* are extremely common and occur in the most diverse situations from marine beaches to high, open woodlands. For a time honey bees visit almost exclusively the inflorescence of this genus, from which annually they gather tons of honey and a great amount of pollen. The visits of the domestic bee are not the result of competition, but solely because of the advantages gained. For the same reason *Andrena canadensis*, *A. nubecula*, *A. hirticincta* and *A. solidaginis* get their pollen and nectar mostly from this genus.

Halictoides novae-angliae, as already stated, visits exclusively in this locality the spikes of the pickerel weed (*Ponte-*

deria cordata). There is no other species of this genus of bees found here. They are rather small bees with a weak flight. As pollinators of the flowers they are much less important than bumble bees, which are present in large numbers and make their visits very rapidly. The flowers are very abundant and offer pollen, nectar and shelter. The nests of these bees are probably close at hand. These are excellent reasons why they should restrict their visits to the inflorescence of the pickerel weed. They cannot be influenced by competition with any other species of *Halictoides*.

The majority of oligotropic bees flying in summer and autumn, whether they be species of *Colletes, Andrena, Perdita, Panurginus* or *Melissodes*, visit exclusively the Compositae. This course tends to produce competition, not to lessen it. The large and crowded inflorescence consisting of many small flowers which can be quickly and easily visited, the great abundance of pollen and nectar, and the commonness and wide distribution of many species are the factors which attract these bees. No other family of plants blooming at this season offers equal advantages. In a paper on the bees of northwestern Wisconsin, Dr. Graenicher gives a list of 30 oligotropic species, of which 19 get their pollen from the Compositae. Many species of *Perdita*, according to Professor Cockerell, are found only on the Compositae, 12 being taken on the flowers of *Bigelovia wrightii*. He further states that there is a "relationship between the size of the bees, the length of their tongues, and the kinds of flowers." In Maine 3 species of *Colletes*, 5 of *Andrena*, 1 of *Perdita*, 1 of *Panurginus*, and 4 of *Melissodes* are oligotropic to the Compositae; and at Carlinville, Ill., a larger number of species in all these genera (except *Perdita*) are reported by Mr. Robertson to get their pollen from the inflorescence of this family. The fact that so many species of bees are oligotropic to the Compositae would seem alone to refute the theory that this habit is an effort on their part to avoid competition by visiting different plant families.

In conclusion it does not seem difficult to understand how

certain bees, with a short term of flight and already exhibiting flower fidelity, have acquired the habit of restricting their visits to common flowers, which offer a great abundance of food materials. Accessory factors are small size, time of flight, length of flight, weak flight, vicinity of nests, and the number of bees. On the other hand, no satisfactory evidence has ever been presented to show that oligotropism is an effort on the part of bees to avoid competition. If there was a scarcity of pollen sufficient to promise severe competition it would appear that it would be a disadvantage to any species of bee to restrict its visits to one kind of food plant.

A new Erycinid from South America (Lepid.).

By Levi W. Mengel, Reading, Pa.

Hermathena quinquemaculata, n. sp.

Expanse of spread insect, 1.03 in. Distance from apex of anterior wing to base, .56 in. Length of body, .41 in.

Color, white, with the following exceptions: Apex of the anterior wing, black. There is a black spot on the middle of the exterior margin.

Hermathena quinquemaculata n. sp. Natural size.

The posterior wing is white, with a small black spot on the apex, another in the middle of the exterior margin and a third towards the anal angle.

The base of the fore wing is black. The head, collar and scapulae are black. The abdominal segments are white, except the anal extremity, which is black. Legs, white. The antennae have black knobs, otherwise white.

Type.—Collection Mengel. *Habitat.*—Neiva, U. S. Columbia.

The Suffert Collection of Butterflies (Lep.)

The large collection of African butterflies, with its numerous types, formed by the late Herr E. Suffert, of Berlin, has passed into the Joicey Collection. Entomologists are invited to compare their specimens with the types.—J. J. Joicey, The Hill, Witley, Surrey. (*The Entomologist,* London, Dec., 1912.)

The Danaine Species of North America and their Mimics (Lepid.).

Bates' Theory as Applied to These Species.

By J. R. HASKIN, Los Angeles, California.

Introductory.

Each of the North American Danaidas, occupying separate and fairly well-defined territories, has a corresponding species of *Limenitis* so clearly resembling it in general appearance as to force the conclusion that their resemblances are the result of mimicry.

Professor E. B. Poulton (1) (5) has pointed out that these American species offer one of the most clear-cut cases of mimicry in the world. *Plexippus* and *archippus*, *berenice* and *floridensis* are well known and a great deal of literature is at hand concerning them. During the past few years my attention has been called more particularly to *D. strigosa* and *L. obsoleta*. The curious mimetic relationship between the other members of the two genera is so strikingly followed out in these two comparatively unknown species that I venture to describe them at some length.

D. strigosa and D. berenice.

It is well known that the North American Danaidas consist of *plexippus* and *berenice*, together with Bates' form *strigosa*. *Strigosa* is generally understood to be like *berenice*, except that the veins on the upper side of the secondaries are finely bordered with ashen gray. There is, however, a much more noticeable difference between the western dry-climate form, which we believe Bates had in mind when he described and named *strigosa*, and the form *berenice* found in the humid semi-tropical climate of Florida. In Arizona *strigosa* is very common and in certain sections thousands of them may be seen during a favorable season. Long series of them show that the rich, uniform, chocolate-brown of the upper side of *berenice* occurs only in the basal area of both wings and along the costal edge of the primary halfway to the apex. The discal areas shade outwardly to a lighter brown and the limbal areas are markedly

light brown. On the under side, especially of the secondaries, the brown is a shade lighter than on *berenice* and may be described as being between the light brown of *plexippus* and the chocolate brown of *berenice*. The black borders of the wings are not so heavy as on *berenice*, nor are the veins on the under side of the secondaries so heavily outlined with black. In my series of *berenice* these black lines on the under side are generally well bordered with ashen gray. This is not often the case with *strigosa*. *Strigosa* generally, though not always, has the veins on the upper side of the secondaries bordered with ashen gray. It very seldom, however, is marked heavily enough to give the butterfly a "streaked" appearance.

Strigosa runs very true to the form described above. It extends over a fairly wide strip of territory from Southern California in the neighborhood of Los Angeles eastward at least to longitude 97 degrees west, and it probably occurs still further east. It would be of great interest to learn from collectors between Texas and Florida whether the change between the two forms occurs gradually or whether *strigosa*'s territory is confined to the semi-arid region of the Southwest. From the limited amount and variety of Florida material available for my study I rather suspect that the late fall brood of *berenice* inclines toward the *strigosa* type of coloration.

Limenitis obsoleta.

Obsoleta is immediately noticeable for the remarkable accuracy with which it has mimicked the coloration of *D. strigosa*. When I first observed it drifting lazily about on the plains near Phoenix, Arizona, I did not give chase, as I had long series of *strigosa*. It was not until I saw one sitting on a flower with wings outstretched and the tell-tale bar across the secondaries plainly in evidence that I realized that it was *obsoleta*. It has exactly the same shade of dark brown in the basal area and along the costal edge. This shades lighter outwardly to a line of black-bordered white spots separating the discal and limbal areas. Outside of this line the brown is noticeably lighter, imitating the corresponding areas in *strigosa*.

On the under side the same close imitation of *strigosa* col-

oring occurs and there is apparently an ingenious attempt to mimic the white spots and dark veins with the means at hand. The shading of the brown is wonderfully good. The veining on the under side of *strigosa*'s secondaries is black with traces of ashen gray bordering. This is followed in *obsoleta* even to traces of the gray border. On the primaries of *obsoleta,* while the veining is black as against brown in *strigosa,* the black is confined to the veins and is not conspicuous.

On the under side of *strigosa* there is what appears at a slight distance to be an irregular black and white line across the secondaries. The combination forming this consists of a black-bordered white spot midway on the costa, the heavy black discocellulars irregularly bordered with grayish-white blotches, and, on the males, the scent pouch which is black centered with white. In approximately the same position on *obsoleta* is a heavy black line with the inner edge bordered with white which is broken up by the black veins into a row of white spots. From its location it reminds one of the white bar of *L. arthemis,* which has been almost obliterated.

This black line and the white spots "show through" on the upper side of the wing and is not in harmony with the close mimicry otherwise displayed.

My theory concerning this feature is that in the attempt to mimic the under side of *strigosa* this bar and the spots were retained and that they persisted on the upper side also. A similar attempt is made on the primaries to imitate the white spots of *strigosa.* Here the black bar is nearly eliminated except near the costal edge. The black and white show through on the upper side also, but assist at this point in the mimicry. In addition to these points all possible traces of white in *arthemis,* and the pale blue lunules in the borders also, are emphasized in white on *obsoleta* in order to give as much as possible the appearance of a considerable number of white spots on the wings.

In support of my theory I would suggest that the Danaidas nearly always keep their wings folded, with the under sides showing, when they are at rest or feeding on flowers in the open. Why should not *obsoleta* attempt the mimicry of this side at the expense of the other?

L. floridensis.

The dark chestnut-brown *floridensis* follows the typical dark form of *D. berenice* just as *obsoleta* follows *strigosa*. A similar uniform shade of dark brown prevails. In this case the white spots have disappeared entirely on the upper side of the male's secondaries and show but faintly on the female's. We may surmise that as the white spots showed too vividly on the very dark coloration of this species they were eliminated as much as possible. They remain on the primaries, where they are needed to mimic the spots on *berenice*.

D. plexippus and L. archippus.

These well-known butterflies have been described so many times that very little need be said about them. Concerning the bar across the secondaries of *archippus*, is it possible that *archippus*, like *obsoleta*, has attempted to imitate the discocellulars of its model?

Archippus has been able to make a more perfect imitation of its model than have the others for the reason that *plexippus* is black-veined throughout. If *strigosa* and *berenice* were similarly veined, the resemblance of their mimics would doubtless be as striking when a detailed comparison was undertaken.

Bionomic Features of the Limenitis Group.

The dark, white-barred Admirals are essentially frequenters of the wooded districts. They may be found flitting about the open spaces of the deep woods and along the edges, but as a rule do not venture far out in the open. Their flight is quick and their attitude alert and vigilant.

The brown Admirals seem to have taken on the habits of their models as well as their coloration. *Archippus* may be found balancing its slow flight far out in the open meadows and perched on the flowers with wings folded in much the same manner as *plexippus*.

The early stages of *obsoleta* are passed among the willows along the Verde and Salt Rivers in Arizona and probably along the other water courses of this country also. I had the good fortune to run into a swarm of beautifully fresh speci-

mens in a thicket of willow near Phoenix, Arizona, and had no difficulty in capturing a fine series. Their flight was slow and unconcerned—not at all like the nervous action of its white-barred cousins. Other specimens taken on the open mesa several miles from the river were not so fresh and evidently had strayed from their breeding grounds. The flight of these was so like *strigosa* that I at first mistook them for their models and allowed a number of them to escape.

The Batesian Theory as applied to these species.

If we could look back into the dim past ages, we might first obtain a glimpse of North America with the white-barred *Limenitis* in evidence. The next glimpse might show a change in the climate about the Behring Sea which enables the progenitor of *plexippus* to find its way across from Asia, where the Danaidas are very much in evidence. This insect, finding the climate and food of the fairly cool temperate region to its taste, increases and multiplies to its present magnificent form. (1)

Strigosa may have drifted across at the same period as *plexippus,* or maybe at a later period. It is remarkably like certain of the Asiatic Danaidas, and probably has changed but little. It found its way down the Pacific Coast and drifted eastward over the hot, dry Southwest. When it reached the humid region of the Southeast it became darker and richer in color.

What happened to our native *Limenitis* from this time on? We have *astyanax* and various forms of white-barred *Limenitis,* the prevailing colors of which are blue and black. We have, also, three well-defined species entirely different in general appearance from the others in that the prevailing color is rich brown. Each of these three species is a remarkably close mimic of the particular species of *Danaida* prevailing in its territory.

Who can doubt that we have here a clear-cut case of imitation by selection? We cannot reasonably conceive that these are all accidental cases of similarity. One such instance might be imagined, but not three.

Why this has happened may eventually be explained to the satisfaction of everyone. Already the ground work on which to frame an answer may be found in the several hundred pages of recorded observations made in Africa and the East Indies. (2) (3). These seem to show that there are certain qualities about the Acraeinae, Danainae and others which make them distasteful to Mantidae, spiders, lizards, birds, mongooses and monkeys. On the other hand, there are many other butterflies which are eagerly eaten.

It is not easy even to imagine how this mimicry has been produced, nor through what ages of time it has taken place. We have, however, recorded observations (2) made in the field covering the actual hunting and capture of butterflies by birds, the finding of quantities of butterfly wings in birds' nests and on the ground under them; pages of illustrations (2) (3), showing butterflies with wings damaged in such a manner that they could have been torn only by the butterfly wrenching itself from the grasp of an enemy. Probably every field collector can recall numerous instances of this same occurrence. I found no less than four just such specimens in a lot of seventy taken during my last day's collecting this year in Arizona. Incidentally I recall, also, a large green mantis sitting in the top of a bush with a *strigosa* struggling in its clutches. I should have waited to ascertain whether it found its prey palatable, but, unfortunately, my time was too limited.

It has been claimed by Dr. Skinner (4) that almost no instances of birds capturing butterflies have been witnessed. The only place where a casual observer would notice such an occurrence would be in the open, where a bird might dash at a flying butterfly. But there must be countless more favorable opportunities when the butterfly is sluggish or torpid from cold, or when it has just emerged from the chrysalis, or is old and feeble with worn-out wings. If our field naturalists make it a point to look for these occurrences, we may gradually obtain a lot of illuminating data.

At a recent meeting of the Entomological Club of Los Angeles, following the reading of the preliminary notes of this article, a discussion of the attacks of birds upon butterflies

proved very interesting. Several members remembered having seen butterflies pursued and caught by swallows, sparrows and kingbirds.

Mr. S. J. Keese gave a very pleasing account of a chrysalis which he watched one day in his mill up in the mining country. A brown butterfly emerged, expanded to maturity, and finally flew out of the window only to be snapped up on the wing by a small flycatcher. Finally, Mr. F. Grinnell, Jr., called attention to an article by Harold C. Bryant on "The Relation of Birds to an Insect Outbreak in Northern California during the Spring and Summer of 1911" (7). In many ways this article is one of the most vitally interesting ever written when taken in connection with the subject of birds preying on butterflies. Mr. Bryant is a trained observer and writer, and was detailed by the California State Board of Fish and Game Commissioners to investigate a remarkable plague of caterpillars followed by a pest of butterflies (*V. californica*) in the northern counties of California, in 1911. His account is so interesting in every detail that it is difficult to refrain from quoting whole pages of it.

The salient features, from our point of view, are as follows: There was an enormous flight of medium-sized butterflies. Of the forty-five species of birds forming the population of this district, none of the smaller ones attacked the butterflies. Of the larger birds only four species preyed on them. Large flocks of red-winged blackbirds (*Agelaius phoeniceus*, subspecies) were in the immediate vicinity, but confined themselves almost entirely to vegetable food. But there was one species, Brewer's Blackbird (*Euphagus cyanocephalus*), which wrought havoc. Large flocks of these birds followed the butterflies, attacking them as they sat in crowded masses about the moist places in the roads and meadows. At the rate of destruction which he personally witnessed, Mr. Bryant computed that it was possible for each bird to destroy 480 butterflies each day, and, if one-third of these were females, the number of eggs destroyed might number 336,000 in a month. The whole article furnishes abundant food for thought. It is to be hoped

that many more observations of a like nature will be made in the near future, and that we shall finally be able to advance Bates' Theory to the dignity of a law.

It may be found that in our present day and generation *arthemis* and the other species of *Limenitis* are no longer used as food. This may not have been so in a past age. The formation of the *Limenitis* mimics may have taken place under conditions quite different from those of to-day. We may easily imagine that the progenitors of the present-day species were of one general form, possibly slow-flying and with other habits which made them an easy prey to birds. One branch may have developed protection by adopting a protective coloration, while the other found protection in a swift flight, quick, alert movements, and the adoption of wooded areas for their habitat. Argue as we may, the fact remains that the mimics exist and, so far, no reasonable explanation has been offered except that advanced by Darwin, Wallace and their followers—the survival of the fittest by natural selection.

In closing I wish to express my very great appreciation of Mr. F. Grinnell, Jr.'s, kindness in lending me all of the publications outlined in the following list of references:

(1) Transactions, Entomological Society of London. 1908. Parts III and IV. Mimetic North American species of the genus *Limenitis* (s. l.) and their models. By Edward B. Poulton, D.Se., M.A., LL.D., F.R.S., etc.

(2) Transactions, Entomological Society of London. 1902. Part III. Nov. Five Years' Observations and Experiments (1896-1901) on the Bionomics of South African Insects, with plates of illustrations. By Guy A. K. Marshall, F.Z.S.

(3) Transactions, Entomological Society of London. 1908. Parts III and IV. Bionomic Notes on Butterflies. By G. B. Longstaff, M.A., M.D., F.E.S.

(4) Journal of the Acad. of Nat. Sci. of Philadelphia. Vol. XV. Second Series, March 21, 1912. Mimicry in Boreal American Rhopalocera. Henry Skinner, M.D., Sc.D.

(5) Annals of the Entomological Society of America. Vol. II, No. 4, Dec., 1909. Mimicry in the Butterflies of North America. Prof. E. B. Poulton.

(6) Spolia Zeylandica, Ceylon, Vol. V, Part XVIII, April, 1908. Mimicry in Insect Life as Exemplified by Ceylon Insects. By E. E. Green, F.E.S.

(7) The Condor, a Magazine of Western Ornithology, Vol. XIII, No. 6, Nov.-Dec., 1911. The relation of birds to an insect outbreak in Northern California during the spring and summer of 1911. By Harold C. Bryant.

Notes on Chilopoda from the Galapagos Islands.

By Ralph V. Chamberlin, Museum of Comparative Zoology, Cambridge, Mass.

A study of a small collection of Chilopods from the Galapagos Islands has revealed five species, of which one, *Scolopendra galapagoensis,* has been previously reported. Of these five species, the three geophiloids are well-known forms occurring widespread in the warm regions of both hemispheres, while the two scolopendroids, so far as now known, appear to be strictly indigenous. The *Cryptops* is here described for the first time.

Whether the geophiloids mentioned may have been introduced in recent times upon ships it is difficult to say; but it seems certainly entirely possible for them to have reached the islands through other agencies than that of man. The resistence of geophiloids to submersion in both fresh and salt water is strikingly greater than that of at least some scolopendrids, this being true not only of the so-called marine forms living normally between tide-marks, such as *Hydroschendyla,* and of those of littoral habit, such as *Pectiniunguis americanus,* but also of those of essentially terrestrial habit. This superior resistence of geophiloids has been experimentally demonstrated by Plateau* who found that, while *Cryptops punctatus* had but feeble resistence to submersion in sea water, being dead after a very few hours, *Geophilus longicornis* might, under favorable temperature conditions, survive complete submersion after removal of every trace of adhering air bubbles for from 12 to 72 hours; and, similarly, that while *Cryptops* might withstand a submersion in fresh water of 6 hours, *Geophilus longicornis* and *G. sodalis* might be alive after from 6 to 15 days. It is reasonable to suppose that the resistence of forms habituated to the littoral life and to consequent frequent submersions would be found to be materially greater than that of these terrestrial species, and that, were the submersion not continuous

* Plateau, Les Myr. marins et la Résistance des Arthropodes a respiration aérienne a la submersion. Journal de l'Anat. et de la Physiologie, Paris, 1890, 26, pp. 236-269.

but intermittent, as would be the case were the specimens afloat upon drift, these might remain alive for very prolonged periods.

GEOPHILOIDEA.

Family Schendylidae.

Pectiniunguis americanus Bollman.

One female from Albemarle Island with 61 pairs of legs.

The occurrence of this species on the Galapagos Islands is not surprising, because of its littoral habits and prevalence about the Mexican coasts under piles of driftwood, etc., upon which it might easily be carried long distances by ocean currents.

Family Mecistocephalidae.

Mecistocephalus punctifrons Newport.

Two specimens from Clipperton Island.

This is a very widespread species occurring upon the Madeiras, the Bermudas, the West Indies, in Central and South America, as well as in India and the East Indies, etc. It has been recorded in part as *M. guildingi* Newport.

Family Oryidae.

Orphnaeus bilabiatus (Newport).

One female from Hood's Island agreeing in all essentials with Central and South American specimens. A very common geophiloid in tropical America, as well as in the Hawaiian Islands, Japan and the East Indies. It has also been recorded as *O. lineatus* (Newport), *O. brasilianus* (H. & S.) and *O. brasiliensis* Meinert.

SCOLOPENDROIDEA.

Family Scolopendridae.

Scolopendra galapagoensis. Bollman.

Specimens from Hood, Chatham, Bindloe, Narborough and Albemarle Islands.

The dorsal spines at the distal end of the prefemur of the twentieth legs vary from 5 to 9 in number, those on the immediately preceding pairs from 5 to 6, while on the anterior pairs the number is nearly always 4.

Family Cryptopidae.

Cryptops navigans sp. nov.

Color yellow or yellow of dilute ferruginous cast.

Head widest near middle, from where the sides, which are convex, converge strongly caudad, more abruptly so toward corners, and also cephalad; the anterior margin convexly rounded, a little indented at middle; caudal margin straight. Sulci not evident. Hairs of moderate length, sparse.

First dorsal plate with a distinct, transverse cervical sulcus well removed from the margin of head. The sulcus is angularly bent back toward the middle, though narrowly rounded at median line. There are no paired longitudinal sulci, but there is a median longitudinal furrow as on subsequent plates.

No paired sulci evident on second plate, but these are traceable on the third and become more distinct caudad. Last plate apparently without a median sulcus.

Prosternum not manifestly punctate; without furrows. Anterior margin convex, slightly indented at middle line; bearing no bristles, but a pair of these borne one each side of median line a little distance caudad of the margin. Bristles of general surface sparse.

Ventral plates not manifestly punctate in the types. Last ventral plate with sides convex, more strongly rounding toward and about the caudal corners; caudal margin widely weakly convex or substraight across the median portion.

Coxopleurae ectocaudally subtruncate, the inner portion of caudal margin extending obliquely mesocephalad to inner edge. Bearing along caudal edge several spines and toward mesal border two or three long stout spinescent bristles.

Spiracles of medium size; circular.

Tarsi of anterior legs uniarticulate, or not movably articulate. Not armed with spines. Hairs sparse.

Prefemur of anal legs with numerous spines over surface, a longitudinal smooth area on mesal surface. Femur similarly armed, but with spines fewer on and toward dorsal surface, where they are replaced by simple hairs; also bearing on ventral surface toward distal end a single acute tooth. Tibia bearing on mesal side three spines and on ventral surface a longitudinal series of four teeth, which increase in size distad; otherwise bearing simple hairs. First tarsal joint bearing ventrally two teeth, of which the more distal is much the larger, otherwise clothed with simple hairs. Second tarsal joint bearing only hairs.

Length, 11 mm.

Locality.—Clipperton Island. Two specimens.

Noteworthy Variations in the Elytral Tracheation of Cicindela (Coleop.).

By Victor E. Shelford, Chicago, Ill.

The elytral tracheation of the Cicindela has been observed by the writer in about one hundred species. The elytra of the newly emerged imagoes of ten North American species have been studied in some detail. Nearly all the common North American species and about fifty exotic species have been studied in less detail by mounting dried elytra in hot canada balsam containing little or none of the usual solvents. The main tracheal trunks and some of the branches remain clearly visible in such mounts for several hours.

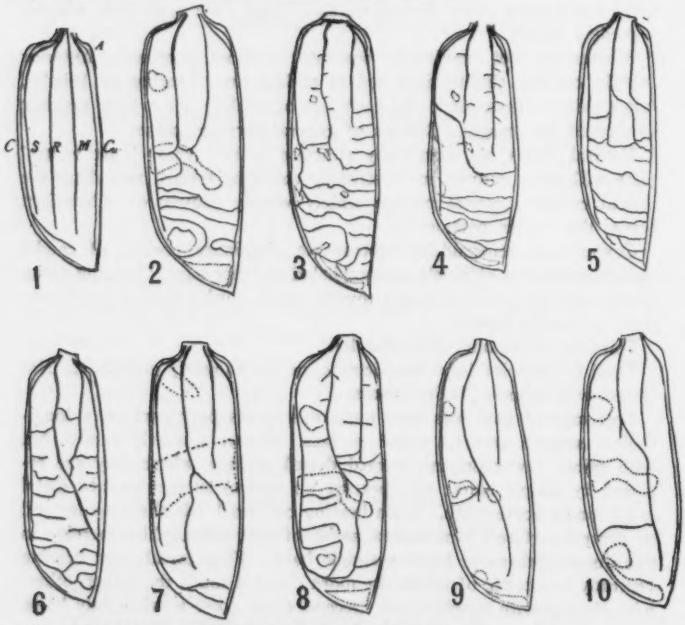

Fig. 1.—Typical arrangement of the main elytral trunks.
" 2.—Variation of rare occurence in *C. limbalis* Klg.
" 3, 4, 5 and 6.—Tracheation of *Cicindela punctulata* Oliv., showing posterior bendings and branching of the radius, the substitution of cross for longitudinal tracheae, and (in 4) a posterior branching of the subcosta.
" 7.—*C. princeps* var. *ducalis* Horn (India); 8.—*C. limbalis* Klg.; 9.—*C. campestris* Linn. (Europe); 10.—*C. silvicola* Dej. (Europe).

In terms of the system of classification proposed by Comstock and Needham*, the usual tracheae present (Fig. 1) are the costa (c) which branches near its distal end and subcosta (s) which lies close to the costa on the outer edge of elytron; the radius (r), and media (m) which lie in the median portion of the elytron; the cubitus (cu) which lies along the suture and (a) the anal rudiment which lies next to the scutellum.

Deviations from the type shown in figure 1 are not numerous, though in occasional individuals a number of large cross tracheae takes the place of the posterior portions of the radius and media as shown in figures 2, 3, 4, and 5. One of the main trunks occasionally crosses over to the region of the next nearer the suture (posteriorly). Branchings in this direction are commonest in other orders. This is shown in figures 4, 5, 8, 9, and 10. Bendings toward the outer margin of the elytron are rare; figure 2 (*C. purpurea limbalis* Klg.) shows the only one noted.

Comstock and Needham, Part II, page 85, state that the main stem of the radius, the most prominent vein of the wing, usually separates into two main branches. In the *Cicindelid* elytra, the radius is most variable. Branching in the middle third of the elytron is evidently common (Figs. 7, 8, 9, and 10.). The commonest type is shown in figure 7. About five per cent. of the elytra of *C. punctulata* Oliv. show such variations. It has been found in *C. princeps* var. *ducalis* Horn (India) (fig. 7; *C. silvicola* Dej. (Europe) (fig. 10); *C. campestris* (Europe) (fig. 9); *C. tenuipes* Dej. (India); *C. pamphilia* Lec., and *C. dorsalis* Say, as well as several other species of *Cicindela* noted before definite records were kept.

If the third elytral trachea is rightly homologized with the third of the wings of other orders, its tendency to branch seems quite remarkable in view of the specialized conditions of the wings concerned. Presumably this represents a reversion to some ancestral type. It is likewise of considerable interest to note the possibility of studying the physiological causes of such divisions and of other variations in connection with the development of the wings.

* American Naturalist, 1899, pp. 43, 81, 231, 335, 413, 561, 769, 903.

Notes on Tomoxia bidentata Say and lineella Lec. (Coleop.).

By C. A. Frost, Framingham, Mass.

In the Coleoptera of Indiana, page 1311, the statement is made that *Tomoxia lineella* "is now recognized as the male of *bidentata*." Mr. Blatchley informs me that this statement is founded, in part at least, on a note by Mr. Linell in Entomologica Americana, Vol. III, page 171, and a letter from the late Prof. J. B. Smith, in which he expresses this belief.

Mr. Linell's note records the fact that he took a series of *bidentata* on a certain log and the next year a series of *lineella* on the same log, but does not explain just how this indicates specific identity. He also mentions the shape of the palpi in *lineella* as suggesting the male.

The suppression of a species on such evidence is entirely unwarranted, to say the least, and I offer the following notes to show that *lineella* differs not only specifically but also in one important character that has been used, with others, to separate allied genera. (Synop. Mordellidae of U. S. by John L. LeConte, M.D., Proc. Acad. Nat. Sc., Phil., 1862, p. 43.)

I refer to the fact, which I have not been able to find in print, that the eyes in *lineella* extend to the posterior margin of the head. I have examined about ten specimens, including the type of this species and also the type of *inclusa* which agrees with *lineella* in this character.

In addition to this generic character it will be seen that, in *lineella*, the anal style is longer and more slender, the apices of the elytra are separately rounded and with a distinct margin, and that the sutural angles are not mucronate.

In *bidentata* the elytral apices are obliquely truncate without distinct margin, and with the sutural angles prolonged in a short spine. The posterior margin of the eye is separated from the posterior margin of the head by a relatively broad pubescent area, which is interrupted near the upper part of the eye by a triangular, glabrous area having the upper side limited by a slight arcuate ridge and having the posterior apex of the triangle extending to the posterior margin of the head.

This area, which is not due to denudation, is somewhat variable and in some females borders the posterior margin of the head for at least a millimeter. There are many other less obvious differences, but the above characters will be sufficient to separate the two species at once.

It may be mentioned here that, while the figure of *lineella* given on Plate I, fig. 28, Synop. of the Mordellidae by John B. Smith in Trans. Amer. Ent. Soc., Vol. X, 1882, is a correct representation of the first specimen in the LeConte Cabinet, all the others in the type series, and all the specimens I have seen, have the outer rows of pubescence nearly obliterated except at a point slightly behind the middle, where they form a quadrate spot that becomes the most distinctive feature of the ornamentation.

Through the kindness of Mr. F. W. Dodge, of Melrose, Mass., I have been able to examine nearly one hundred adults of *T. bidentata* and also the larvae and the pupae.

The males of this species can readily be separated by the more pronounced arcuation of the front tibia, the inner face of which is set with erect hairs; these become distinctly setaceous near the apex, which is noticeably enlarged when viewed from in front. The lower edge of the front femora, in the males, is fringed with long cinereous hairs and the maxillary palpi are also clothed with longer pubescence. All these male characters, except the enlarged distal end of the front tibiae, hold good in my limited series of *lineella*. There are other slight differences in the shape of the tip of the anal style, last joint of the palpi, and the joints of the antennae.

Larval characters.—One of the larvae given me shows signs of having been near pupation when placed in the alcohol. The other is yellowish white, cylindrical, slightly arcuately bent, and measures 19 millimeters from the mandibles to the tip of the anal process. The head, which is narrower than and retracted into the first thoracic segment, is sparsely covered with slightly darker granulations, each bearing a yellowish hair. The mandibles are nearly black at the tips, becoming light brown toward the bases. The front has a slight median sulcus from above the clypeal area to the occiput. With my limited optical instruments, the antennae appear to be four-jointed, proceeding from a large fleshy tubercle; the first joint is short, slightly smaller than the

basal tubercle; the second is slightly longer, much narrower, the base brownish; the third is still narrower, brownish, and longer than the second; what I have called the fourth joint seems to be two minute yellowish processes.

The first thoracic segment has a darker, transverse, dorsal line with the ends near the front margin on each side and extending arcuately backward and terminating in two flat, irregular elevations on each side of the middle near the posterior margin of the segment. On the ventral side of the segment, between the legs, there is an area covered with stronger granulations and coarser hairs. In front of the legs there is a fleshy fold that has the appearance of a separate segment as the limiting ruga extends completely across the under side.

The legs are short conical processes, with vague joints, projecting from large udder-like tubercles.

The sutures between the thoracic segments are deep, and the second and third segments are obliquely wrinkled at the sides and again on the disk; the two latter rugae form an anterior dorsal lobe. The anterior stigmata are plainly visible between the first and second segments.

All the abdominal segments are sparsely covered with hairs, which are more evident on the under side, projecting from distinct granulations of a darker color. These granulations become darker brown and more pronounced on a small median area of the ventral portion of the eighth and ninth abdominal segments. Dorsally and laterally the ninth (anal) segment is covered with strong, dark brown asperities, each bearing the usual hair, and increasing in length toward the apex which is tipped with a horny projection that suggests the cremaster of certain lepidopterous pupae. This appears to be built out by extreme elongations of these asperities and is triangulately emarginate at the apex. This dark brown projection is more than half a millimeter in length.

Pupa.—The pupa is straight and measures from 12 to 14 millimeters in the series before me. The head is sparsely set with projecting granulations or asperities. On the prothorax they are less numerous except at the posterior angles. The wings are set with rows of these elongated granulations placed on distinct and parallel costae. The abdominal segments have irregular patches of these granulations, two dorsal, two smaller sub-dorsal, two larger lateral, and below the last an irregular row which is broadly interrupted at the ventral center of the segments. The anal style is also sparsely set with asperities. The tip of the abdomen has two divergent fleshy tubercles.

Occurrence and habits.—The following records of capture are at hand: Several *bidentata* were taken on a dead elm at Medford, Mass., June 30 and July 15, 1903. Nine *bidentata* were taken on a dead beech at Monmouth, Maine, June 29, 1912. On this tree I saw a pair *in copula*. Six *lineella* were

taken on a dead (beech?) tree at Monmouth, June 27, 1906. This tree was within a few hundred feet of the tree previously mentioned. One *lineella* was taken on a pile of slabs at Monmouth, June 22, 1910.

It has been my experience that both species are very wary and hard to capture. I have waited an hour for them to return to the tree from which they had been driven.

From a paper which Mr. Dodge has very generously placed in my hands, I quote the following notes on *T. bidentata*: "Most of the captures were made on the trunks of several dead oak trees and they could not be found on other trees nor on oaks with any appearance of life. They are very quick to take wing but rarely go more than a few feet, in fact they seem reluctant to leave the particular tree on which they are found.

On the 30th of June it was discovered that they were emerging from the fungus-covered stump of a decayed oak. With the help of a hatchet and knife, larvae, pupae, adults, and a probable hymenopterous parasite were uncovered. The larvae appear to pass most of their life in the more solid, central part of the stump, but when they are ready to pupate they work their way into the more decayed outer wood and there excavate a pupal chamber which they line with a soft whitish substance. These pupal chambers were frequently found from four to six inches from the surface, but on account of the soft condition of the wood the adults probably had no difficulty in reaching the outer air."

Mr. C. T. Brues has determined the supposed parasite as *Arotes amoenus* Cresson.

The Vote on Priority in Nomenclature.

Since our last announcement on this subject (ENT. NEWS, November, 1912, page 423), a "better late than never" vote "that the law of priority should be strictly applied in all cases," has been received from Mr. J. R. de la Torre Bueno. The total vote taken by the NEWS now stands 99 for strict priority and 197 against. *Science*, in its issue of December 13, 1912, reported the vote of the Central Branch of the American Society of Zoologists as 13 in favor of strict priority and 35 against, followed by an elaborate analysis of the vote.

A New Form of Hemileuca burnsi (Saturn., Lep.).

J. HENRY WATSON, Withington, Manchester, England.

H. burnsi ab. **paradoxa** n. ab.

Abdomen less black than typical *burnsi*, with the first two segments above heavily sprinkled with reddish hairs. (Other females of *burnsi* also have these reddish hairs in a less degree.) Ground color of all wings very pale buff, not white. The apex dark lilac-brown in color, more heavily marked. The costal margin lightened between the two black bands by having long white hairs interspersed; the outer margin beyond the sub-marginal stripe darkened with the same scales as apex.

Hind wings similarly (though less heavily) marked beyond the black marginal line. Fringes of wings color of apex and showing as a dark line. (I have a female of typical *burnsi* which has the margins of wings black and fringes white).

Wings below similar but more heavily marked than above; the whole of hind wings being this lilac-brown color, which resembles almost the shade of heavily-marked specimens of male *Euleucopheas oliviae* (Ckll.), which, however, have always noticeably pale fringes.

Type.—One female emerged from a two-year pupa, Sept. 27, 1912. Taken at Reno, Nevada. In coll. J. Henry Watson.

What can be the reason of such a variation I do not know, unless it may show the affinity to *Euleucopheas oliviae* and *tricolor*, but from which *H. burnsi* and *neumoegeni* (Edw.) may be at once separated by the shorter antennae of the male.

Since this specimen emerged, I at once examined my series of *burnsi*, which is a fairly long one; and I find one or two specimens have just a few scattered scales of this color on the upper surface, near the post-discal black line, and with the under surface darkened chiefly on veins with these smoky lilac scales, all being females.

Photographs of Entomologists desired.

The Entomological Section of the Philadelphia Academy of Natural Sciences desires for its entomological album the photograph of every entomological student. The collection contains over 300 at this date. A list was published in the NEWS 1902, pages 45-47, of those in the album at that time. We hope that those who can do so will write their names and date of birth on the back of each photo, along with any other information concerning themselves they may wish to impart.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.—Ed.

PHILADELPHIA, PA., MARCH, 1913.

An eminent zoologist wrote, many years ago:

The anatomical error in reference to the auricles of Reptiles and Batrachians on the part of Linnaeus [cor uniloculare, uniauritum] is extremely interesting, since it shows to what an extent the most patent facts may escape the observation of even the greatest observers, and what an amount of repeated dissection and unprejudiced attention has been necessary before the structure of the commonest animals has become known. . . . . .

It is astonishing how many good observers it requires to dissect and draw and record over and over again the structure of an animal before an approximately correct account of it is obtained.*

If these remarks be true concerning the acquisition of anatomical truth, how much more strongly must similar reflections apply to the ascertainment of physiological fact. The honey or hive bee, through its partial domestication by man, must surely be reckoned among the commonest insects: its structure and its habits have been repeatedly described by observers in different countries. Yet, according to the recent publications of Dr. D. B. Casteel,† the conceptions hitherto prevailing as

*E. R. Lankester, art. Zoology, Encyc. Brit., 9th edit., Vol. XXIV, p. 806. 1888.

†The Manipulation of the Wax Scales of the Honey Bee. By D. B. Casteel, Ph.D. Circular No. 161, Bureau of Entomology, U. S. Dept. of Agriculture. Issued October 4, 1912.

The Behavior of the Honey Bee in Pollen Collecting. By D. B. Casteel, Ph.D. Bulletin No. 121 of the same. Issued December 31, 1912.

to the manner in which the pollen-baskets of the workers are loaded, the structures concerned, and the supposed use of the "wax-shears" are largely false. The marvelous modifications of the worker's legs, apparently so well adapted to her various functions, remain as marvelous as before, but they are employed in quite other ways than those in which they have been believed to act.

If such a revolution in the interpretation of the functions of an insect so well known as the hive bee can take place in this day and generation, how many other supposed facts may be overturned as the commoner insects are more and more intensively studied. This concrete case of the honey bee, as exemplified by Dr. Casteel's results, ought surely to be a warning to those who hold that, because one investigator is engaged on a certain piece of research, it is useless and a waste of time for another student to devote his time and energies to the same subject.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

The Harlequin Cabbage Bug in Iowa. (Hemip.).

Being unable to find a record of the occurrence of *Murgantia histrionica* Hahn, in Iowa, the following note may be of interest.

In October, 1911, a male and a nymph of this species, the latter about half grown, were found along a small creek near Iowa City by O. W. Rosewall. There were several truck patches in the vicinity, in some of which cabbage and other cruciferae were grown, but no damage from these bugs has yet been reported in this locality.

Chittenden (Circular No. 103, U. S. Department of Agriculture, Bureau of Entomology) says: "This species has obviously become diffused from a central point of dispersal, Mexico, chiefly in the following three directions: (1) From Texas eastward through the Gulf States and northward along the Atlantic seaboard to Long Island; (2) from Texas northward through the Mississippi Valley and thence through the Ohio River region into Ohio; (3) from Mexico into the neighboring States and Territories, and from Lower California into Southern California and Nevada."

This is, I believe, the first Iowa record of the pest and shows that, although it is not common here, the range is gradually being extended through the Mississippi Valley.—DAYTON STONER, State University of Iowa.

United States Civil-Service Examination for Scientific Assistant. Department of Agriculture.

The United States Civil Service Commission invites attention to the regular spring examinations for scientific assistant, Department of Agriculture, to be held April 9 and 10, 1913, at the principal cities of the States. Entomology is among the subjects given, and persons desiring to be examined should apply to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at the places of examination, for application and examination form 1312, using the exact title as given at the head of this announcement in making application. Application should be made in ample time as soon as possible before the date of examination.

The Adams Collection of Lepidoptera.

This exceedingly rich and very extensive collection [of Exotic and Palaearctic Lepidoptera, formed by the late Herbert Jordan Adams (1838-March 1, 1912), of Roseneath, Enfield, England, said to be particularly rich in *Ornithoptera* and other fine Rhopalocera] is now installed in the Natural History Museum at South Kensington. It is contained in sixty-eight cabinets and numerous store-boxes. The number of specimens probably totals something like 150,000, among which are hundreds of types—*The Entomologist's Monthly Magazine*, Oct., and *The Entomologist*, Dec., 1912.

Two New Generic Names in Muscoidea (Dip.)

I am indebted to Professor T. D. A. Cockerell for advising me that the generic names *Oestropsis* and *Protogonia*, used by me in my recently published paper, entitled "New Genera and Species of Muscoid Flies from the Andean and Pacific Coast Regions of South America" (U. S. N. M., 1912), are preoccupied. I hereby propose *Euoestropsis* n. n. for the former, and *Protogoniops* n. n. for the latter. The synonymy will stand as follows:

EUOESTROPSIS Townsend, 1913.

Syn. *Oestropsis* Towns., 1912 (non Brauer, 1868; non Smith, 1868).

PROTOGONIOPS Townsend, 1913.

Syn. *Protogonia* Towns., 1912 (non Cope, 1881).—CHARLES H. T. TOWNSEND.

Bromeliadicolous Insects.

The insect fauna of epiphytic bromeliads, which in this country has been discussed by Knab, Alexander, Malloch, Calvert and others, has been receiving attention recently in Europe. Señor C. Picado, of Costa Rica, now in Paris, in the *Comptes Rendus* of the Academy of Sciences

for 1911 (tome cliii), has compared the water-containing epiphytic bromeliads to a great fragmented swamp or marsh extending throughout intertropical America and discusses their biological characteristics in general. Mr. Hugh Scott, curator in Entomology in the University of Cambridge, has given an account, in the *Annals and Magazine of Natural History* for October, 1912, of bromeliadicolous insects of the islands of Trinidad and Dominica, which he collected in March, 1912. Mr. G. C. Champion, of the *Biologia*, has re-examined some of the bromeliadicolous Coleoptera of Costa Rica collected by Calvert and studied material received from Señor Picado, finding that 12 families are represented by those hitherto and now recorded (*Entom. Mo. Mag.*, January, 1913). Additional Orthoptera (a Blattid described by Shelford in Mr. Scott's paper) and Hemiptera (a *Microvelia*, by Distant in the same, and a Lygaeid by Mr. Champion), are also made known as members of this fauna.

Still more recently Senor Picado has described (Bull. Soc. Zool. France, XXXVII, No. 10. Jan. 31, 1913) a new species of *Scirtes*, *S. championi*, and its larva, which he reared from among the leaves of Costa Rican bromeliads. This insect is a member of the Coleopterous family Dascillidae.

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted, always excepting those appearing in the January and February issues, which are generally dated the year previous.

The records of systematic papers are all grouped at the end of each Order of which they treat, and are separated from the rest by a dash.

For record of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

4—The Canadian Entomologist. **7**—U. S. Department of Agriculture, Bureau of Entomology. **9**—The Entomologist, London. **11**—Annals and Magazine of Natural History, London. **13**—Comptes Rendus, Societe de Biologie, Paris. **14**—Proceedings, Zoological Society of London. **22**—Zoologischer Anzeiger, Leipzig. **38**—Wiener Entomologische Zeitung. **50**—Proceedings, U. S. National Museum. **51**—Novitates Zoologicae, Tring, England. **69**—Bollettino, Societa Italiana Entomologica. **76**—Journal, Cincinnati Society of Natural History. **84**—Entomologische Rundschau. **89**—Zoo-

logische Jahrbucher, Jena. **94**—"Das Thierreich" herausgegeben von d. Deutschen zoologischen Gesellschaft, Berlin. **102**—Proceedings of the Entomological Society of Washington. **110**—Bulletin, Societe d'Histoire Naturelle de Colmar. Nouvelle Serie. **119**—Archiv fur Naturgeschichte, Berlin. **136**—Stettiner Entomologische Zeitung. **148**—New York Agricultural Experiment Station, Geneva. **152**—California Agricultural Experiment Station, Berkeley. **166**—Internationale Entomologische Zeitschrift, Guben. **175**—Aus der Natur, Berlin. **189**—Pomona Journal of Entomology, Claremont, Cala. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **216**—Entomologische Zeitschrift, Frankfurt a. M. **238**—Anales, Sociedad Cientifica Argentina, Buenos Aires. **302**—Mitteilungen Naturwissenschaftlichen Vereins an der Universitat Wien. **310**—L'Echange. Revue Linneene. Moulins. **313**—Bulletin of Entomological Research, London. **324**—Journal of Animal Behavior, Cambridge, Mass. **327**—Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India (new Ser.), Calcutta. **344**—U. S. Department of Agriculture, Washington, D. C. **359**—Connecticut Agricultural Experiment Station, New Haven. **369**—Entomologische Mitteilungen. Berlin-Dahlem. **381**—Experiment Station Record, Washington, D. C. **408**—Dominion of Canada, Department of Agriculture, Experimental Farms. Division of Entomology, Ottawa. **411**—Bulletin of the Brooklyn Entomological Society. **414**—Transactions of the Norfolk and Norwich Naturalists' Society. **415**—Boletin de Fomento, Organo del Ministerio de Fomento, San Jose, Costa Rica. **416**—Revista de Ciencias, Lima, Peru. **417**—University Studies, Lincoln, Nebraska. **418**—The Philippine Agricultural Review, Manila.

GENERAL SUBJECTS. Anon.—Economic entomology, **381,** xxvii, 655-663. Proposte della commissione per la nomenclatura zoologica italiana nominata dall'assemblea di bromio della Unione Zoologica Italiana 1908, **69,** xliii, 238-45. **Britton, W. E.**—Report (12th) of the state entomologist of Connecticut, **359,** Report 1912, 209-96. **Cameron, P.**—Obituary, **9,** 1913, 24. **Dewitz, J.**—The bearing of physiology on economic entomology, **313,** iii, 343-54. **Fritsch, W.**—Stimmungsbilder aus dem jahre 1912, **84,** xxx, 1-3. **Hamann, W.**—Ueber die einrichtung und den betrieb kleiner insektarien, **166,** vi, 271-73. **Hammond, J.**—An investigation concerning the food of certain birds, **414,** ix, 316-327. **v. Hanstein, R.**—Biologie der Tiere. Verlag von Quelle & Meyer, Leipzig, 1913, 404 pp. **Hewitt, C. G.**—Legislation in Canada to prevent the introduction and spread of insects . . . destructive to vegetation, **408,** Bull. No. 6. **Knab, F.**—Blood-sucking insects as transmitters of human disease, **102,** xiv,

219-21. **Knorzer, A.**—Deutschlands wärmste gegenden und ihre insektenfauna, **110,** xi, 1-24. **Lyman, H. N.**—The second international congress of entomology, **4,** 1912, 370-71. **McAtee, W. L.**—Index to papers relating to the food of birds by members of the biological survey, **344,** Biol. Sur., Bul. No. 43. **Mitzmain, M. B.**—Collected notes on the insect transmission of surra in carabaos, **418,** v, 670-81. **Pantoja, R.**—La tiriasis en los animales domesticos, **415,** ii, 708-713. **Poche, F.**—Die bestimmung des typus von gattung ohne ursprunglichen solchen, ... **119,** 1912, A. Heft 8, 1-110. **Schoenichen, W.**—Ueber diapositive fur den naturgeschichtlichen unterricht, **175,** ix, 262-265. **Schroder, E.**—Zur geschichte der zoologischen und botanischen nomenklatur im 19 Jahrhundert, **175,** ix, 232-239. **Viereck, H. L.**—Entomology at the centenary of the Academy of Natural Sciences of Philadelphia, **102,** xiv, 193-94. **Weiss, H. B.**—Some ancient beliefs concerning insects, **411,** viii, 21-23.

ARACHNIDA, ETC. Hilton, W. A.—A preliminary study of the central nervous system of spiders, **189,** iv, 332-36. **Quayle, H. J.**—Red spiders and mites of citrus trees, **152,** Bul. 234.

Roewer, C. F.—Die familie der Cosmetiden der Opiliones-Laniatores, **119,** 1912, A, H. 10, 1-122.

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dae). London, Taylor & Francis, 1912, 581 pp. **Cole, F. R.**—Notes on the D. of Laguna Beach, **189,** lv, 837-40. **Johnson, C. W.**—The North American sp. of the genera Arthropeas and Arthroceras, **4,** 1913, 9-12. **Krober, O.**—Die Thereviden Nordamerikas, **136,** 1912, 209-72. **Malloch, J. R.**—One n. g. and 8 n. sps. of dipterous insects in the U. S. National Museum collection, **50,** xliii, 649-658. **Walton, W. R.**—A n. sp. of Tachinidae from Porto Rico, **102,** xlv, 198-200.

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HYMENOPTERA. Caesar, C. J.—Die stirnaugen der ameisen, **89,** xxxv, 161-242. **Crosby, C. R.**—Notes on "Syntomaspis druparum" and "Ichneumon nigricornis," **4,** 1912, 365-366. **Morton, F.**—Die bedeutung der ameisen fur die verbreitung der pflanzensamen, **302,** X, 77-85 (cont.). **Rudow, Dr.**—Die wohnungen und lebensfahigkeiten der honigsammelnden bienen, Anthophilidae, **216,** xxvi, 165-66 (cont.). **White, G. F.**—Sacbrood, a disease of bees, **7,** Circ. 169.

Cockerell, T. D. A.—Descriptions and records of bees, xlviii, **11,** xi, 54-65. Two new Canadian bees **4,** 1913, 12-14. Canadian bees in the British Museum, **4,** 1912, 354-358. **Crawford, J. C.**—Notes on some Canadian bees, **4,** 1912, 359-360. On the status of some sp. of the genus Panurginus, **4,** 1912, 367-68. **Girault, A.**

A.—A synonymic note on the Mymaridae and Trichogrammatidae, **102,** xiv, 221-22. New chalcidoid genera and sp. from Paraguay, **119,** 1912, A, H. 9, 160-177. **Viereck, H. L.**—Descriptions of one new family, 8 n. g. and 33 n. sp. of ichneumon flies, **50,** xliii, 575-593.

INSECUTOR INSCITIAE MENSTRUUS.—A Monthly Journal of Entomology, Vol. I, No. 1, January, 1913. Conducted by Harrison G. Dyar, 1512 21st St., N. W., Washington, D. C. The title in large type is very imposing, but at first glance suggests nothing of an entomological journal. The English title conveys more to the illiterate. However this may be, *Scientia est potentia* or, in vulgar parlance, knowledge is power and this is a menstruus, or monthly, and persecutes ignorance twelve times a year, unless there should happen to be a miss. The publication "is undertaken in memory of Augustus Radcliffe Grote, the best lepidopterist of America, living or dead, whose writings have always been to me a model and an inspiration." The modesty of the conductor is quite overwhelming. The model, "The North American Entomologist," on which the present Journal is based, was discontinued at page 104. The Conductor of the *Menstruus* says, "We hope to conduct this on the same lines." "Whether it lasts longer or not remains to be decided." There are one dozen pages in the first part, devoted to a very good paper, entitled "Notes on Cotton Moths" (Lepidoptera, Noctuidae). By Harrison G. Dyar. The *Menstruus,* as the name indicates, comes out monthly, sold by subscription, $2 a year in advance, payable to the Conductor. The price seems high, but no one can tell in advance how much ignorance may be persecuted monthly.—H. S.

PSYLLIDARUM CATALOGUS. Auctore Dr. G. Aulmann. (W. Junk, Berlin W. 15.) 1913.

We are glad to see a catalogue of the Homopterous family Psyllidae, and published by the well-known firm of W. Junk, of Berlin. It is gotten up in the same style as the *Coleopterorum Catalogus,* which is now becoming familiar to coleopterists. This catalogue includes the species of the world and is complete in 92 pages. It will certainly prove of value to students of that family and they should know of its existence.

Doings of Societies.

FELDMAN COLLECTING SOCIAL.

Meeting of May 15th, 1912, at 1523 S. 13th St., Philadelphia; fourteen members were present; Pres. Haimbach in the chair.

Mr. Wenzel, Sr., recorded *OEdionychis fimbriata* Forst. from Iona, IV-27, as new to southern New Jersey.

Mr. Laurent said if corks were dipped in paraffine the crevices would be filled and they would make better stoppers for the bottles and could be easily removed.

Mr. Daecke said it is a remarkable year for insects about Harrisburg. He exhibited two species of the Lepidopterous family Thyatiridae: *Euthyatira pudens* Gn., Rockville IV-24-'12 and *Habrosyne scripta* Gosse, Conewago VIII-14-'09 and stated that these species, though conspicuously colored, were very difficult to find owing to their similarity to the form and color of the surroundings which they select for resting on. He recorded the Noctuid, *Baileyia ophthalmica* Gn., Harrisburg V-10-'12. He further exhibited a pair of *Criorhina nigriventris* Walton (Dip.), taken at Rockville, IV-28-'12, and spoke of their likeness to the bumble-bee in flight, general appearance and buzzing. He also pointed out the difference between this species and *C. verbosa* Wlk., the latter species having been rather common this season. Two specimens of *Sthenopis argenteomaculatus* Harr. (Lep.) were also shown which were reared from the bases of Alder (*Alnus*). The larvae were found by Mr. Champlain, near Harrisburg, in March, this season, and the adults emerged May 7th and 8th. There were six larvae alongside each other in as many borings in one Alder stick about two and one-half inches in diameter, which could be easily seen in the stem shown.

Dr. Skinner said he had collected the latter species at Lloydminster, north Saskatchewan, VII-31, and also recorded *Lithocolletes propinquinella* Braun (Lep.) Ardmore, Pa., V-5-'12.

Mr. Geo. M. Greene exhibited a pair of *Abia americana* Cress. (Hym.) collected at Castle Rock, Pa., IV-21-'12, by C. T. Greene. Also read an article on collecting insects by Anna Van Rensselaer Morris. This clipping was from the North American Monthly Magazine, May 12th, 1912, and was typical "newspaper entomology."

Dr. Skinner said while looking over the *Dorcus* in the American Entomological Society collection he noticed that

in *parallelus* the mandibular tooth is perpendicular, while in *brevis* it is horizontal and parallel to the mandible.

Adjourned to the annex.

Meeting of November 20th, 1912, at 1523 S. 13th St., Philadelphia; twelve members present; President Haimbach in the chair.

Mr. J. Wagner Green, of Easton, Pa., was elected an active member of the Social.

Mr. Wenzel exhibited two interesting boxes of Chrysomelidae including *Odontota, Cassida,* etc., remounted and rearranged.

Mr. Kaeber exhibited *Heterocerus brunneus* Melsh. (Col.) from Phila. Neck, VII-4-'12, which he had caught by throwing water on the mud banks, after which they could be seen as they leave the ground and easily captured and are apparently dry when taken.

Mr. Laurent exhibited eggs of a Neuropteron fastened to a leaf, Mt. Airy, Pa., VI-24. These were identified by Mr. Daecke as a "lace wing," *Chrysopa* sp.

Adjourned to the annex.

The twenty-fifth annual meeting was held December 18th, 1912, at 1523 S. 13th St., Philadelphia; eight members were present; Vice-president H. A. Wenzel in the chair.

Letters of congratulation on the Social's reaching the quarter century mark were read from Dr. Calvert and C. T. Greene.

Prof. Calvert exhibited some Costa Rican Odonata of the genus *Thaumatoneura* collected by himself. He stated that they were water-fall dwelling insects and he had caught them only at three falls of the several visited. Where they were missing he had noticed lizards about and as they are slow-flying insects this might account for their absence. A pair of each of two species (caught in coitu) were shown and while great differences were easily seen in the males, it was almost impossible to distinguish the females of *T. pellucida* and *T. inopinata.*

Mr. Wenzel exhibited several specimens of *Phanaeus carni-*

fex Linn. (Col.), all males, showing great variation in size. Some of the smaller ones had the thoracic horn entirely absent.

Mr. Daecke showed a root of "Clot bur" (*Xanthium strumarium* Linn. from which he had bred the weevil *Baris interstitialis* Say (as determined by Col. Casey). These specimens had emerged in the fall and then crawled back in the gallery made by the larvae, showing that they hibernate in the adult stage. The plant is common on the islands in the Susquehanna River.

Dr. Skinner said he had been working on the Hesperidae and found one group, the "black skippers," very difficult to determine from the descriptions. He has kept all the specimens he has received in this family and now without doubt the American Entomological Society has the finest collection of them in the world.

Mr. Geo. M. Greene exhibited a specimen of *Polypleurus geminatus* Sol. (Col.) collected by himself under chips at East Falls Church, Virginia, XII-7-'12. This genus was discussed at the November, 1911, meeting.

Adjourned to the annex.

GEO. M. GREENE, *Secretary.*

ENTOMOLOGICAL SECTION, ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

Meeting of November 21, 1912. Mr. Philip Laurent, Director, presided. Ten persons present.

Mr. Rehn made a communication on the recent field trip made by Mr. Hebard and himself to the Florida Keys and Texas. Three months, June 29th to October 29th, were spent in the field and a series of over fifteen thousand Orthoptera, the particular object of the trip, as well as some hundreds of other insects, were secured. The speaker outlined the trip and discussed the features of collecting in portions of the country traversed. The objective points in Texas were the Brownsville region and the Chisos mountains in the bend of the Rio Grande, both of which were examined, while over fifty other

localities were visited. A number of photographs illustrating the talk were shown.

Dr. Calvert asked whether the Florida Keys species were largely West Indian. Mr. Rehn said they were about equally divided between West Indian and mainland forms.

Mr. Laurent exhibited a female specimen of *Papilio philenor,* in perfect condition, which he captured at Mt. Airy, Philadelphia, on November 1st of the present year. The speaker stated that this was an unusual time for this species to be found on the wing, and that no doubt some unusual cause had something to do with the appearance of the butterfly at this time of year. Mr. Laurent also exhibited prepared cabinet specimens of the larvae and chrysalids of the six species of *Papilio* known to breed in Pennsylvania.

Dr. Skinner exhibited both sexes of *Lycaena neurona,* an interesting little species, found so far only in California.

Mr. R. C. Williams was elected an Associate.

Meeting of December 9, 1912. Mr. Philip Laurent, Director, presided; nine persons present.

Mr. Rehn exhibited a series of specimens of the sub-family Proscopinae of the Acrididae, belonging to the Academy, largely from Argentine material sent for study. Many of these were very rare in collections. Dr. Calvert called attention to their remarkable resemblance to Phasmidae. Mr. Rehn pointed out the anatomical differences between the two families.

Mr. Hornig said he had found larvae of *Culex pipiens* out of doors on November 30th, and that Culicid larvae mature much faster in dirty water than in clean, and that more males than females were bred from clean water.

The following persons were elected to serve as officers for the year 1913: Director, Philip Laurent; Vice-Director, H. W. Wenzel; Treasurer, E. T. Cresson; Conservator, Henry Skinner; Secretary, J. A. G. Rehn; Recorder, Henry Skinner; Publication Committee, E. T. Cresson and E. T. Cresson, Jr.

Mr. Jacob Kotinsky was elected an Associate.

HENRY SKINNER, Recorder.

Franklin A. Merrick.

Mr. Franklin A. Merrick, of New Brighton, Pennsylvania, died at 11.55 P. M., December 16, 1912. He was a life-long resident of New Brighton, where he was born January 17, 1845. After leaving public school in 1860, he entered the car works of Merrick, Hanna & Company until the summer of 1862, when he enlisted in Hampton's Independent Battery F, Pennsylvania Light Artillery. He was commissioned a lieutenant in the battery and served till July 26, 1865, when he was honorably discharged with his company. During 1866 he took a course in Smith's Business College, Pittsburg, after which he engaged in the foundry and plumbing business until 1896, when he retired from active work.

With the purchase of a small collection from Mr. Glasser he entered the study of entomology and devoted his leisure time to the collecting of Lepidoptera, in which pursuit he was assisted by his son, the late Harry D. Merrick. By industrious work during day time and the use of trap lights in a forest, a very interesting collection was accumulated and a number of species new to science were discovered. "Progress and Improvement" were our late friend's motto, and he showed this inclination even in the pursuit of his hobby by designing and inventing his trap lights, a collecting jar for high-resting moths and later a much improved apparatus for inflating larvae.

Mr. Merrick enjoyed an extensive correspondence and found much pleasure in filling several boxes from his duplicate stock and sending them to his friends. The death of his son proved a shock to him from which he never fully rallied, and Bright's disease undermined his health. For several years he spent the winter in Florida, but gained no permanent relief. Mr. Merrick was united in marriage with Laura Jane Duncan, of Fallston, Pa., who survives him.

Mr. Merrick disposed of his collection last year to Dr. Wm. Barnes.

HENRY ENGEL.

MR. L. E. RICKSECKER, well-known collector of California insects, died in San Diego in that State, January 30, 1913.

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Dynastes hercules beetles direct from the original collector. Two new localities, namely St. Lucia and British Guiana, also from Dominica; for sale or exchange.—A. F. Porter, Decorah, Iowa.

Wanted—Living pupae of Saturnid moths. State quantity and price. Phil. Rau, 4932 Botanical Ave., St. Louis, Mo.

Change of Address—F. H. Wolley Dod, Millarville, Alta, to Midnapore, Alta.

For Exchange—*Cychrus andrewsii* and *Cychrus ridingsii* with full data.--T. N. Brown, 71 Highland Ave., Uniontown, Pa.

Wanted for Cash or good exchange, all American live pupae and cocoons, and 100 or more North American Parnassius in paper not expanded. Give nice exotic Lepidoptera and nice large Coleoptera.—Communicate with Monsieur Frank Sever, 333 E. 49th St., N. Y. City.

Lepidoptera—Specimens of diurnals from this section in exchange for other N. A. species new to my collection.—R. A. Leussler, 1137 S. 31st St., Omaha, Neb.

Perfect, fresh mounted specimens of Nocturnal Lepidoptera (both Macro- and Micro-) from this locality offered for exchange.—Fred Marloff, Box 104, Oak Station P. O., Allegheny Co., Pa.

Wanted to buy, sell and exchange insects for demonstration and class work in economic entomology and bulletins and reports from U. S. Dept. Agric. and Agr. Exper. Stations on all subjects.—R. W. Brancher, Kent, Ohio.

Catocalae—*C. desdemona, *beutenmulleri, ilia* var. sp., *aholibah, coloradensis, pura, faustina* and several varieties, *irene* and varieties, *aspasia* var. sp., *zillah, *lydia, verecunda, edwardsi*—only a few left of the species marked *.—Tom Spalding, R. F. D. 208z, Provo, Utah.

For Exchange—A few extra entomological publications. Want Ditmar's Reptile Book, biological material, etc.—Fred. S. Carr, 163 Margueretta St , Toronto, Ontario.

Attacus atlas—Largest moth in the world. Fresh bred specimens just received from Philippine Islands, with date and locality, for sale or exchange.—A. F. Porter, Decorah, Ia.

T. Fukai, Konosu, Saitama, Japan, will send Japanese and Formosan insects, especially Lepidoptera and living cocoons.- Exchange solicited.

Wanted Parnassiinae from Alaska and West Coast America in exchange for those of all European and Asian localities; particularly Thian Shan and high altitude, Himalaya Mts.—J. Henry Watson, 70 Ashford Road, Withington, Manchester, England.

Hesperidae—I offer in exchange the following species of *Pamphila* for N. A. Lepidoptera not in my collection. *Pamphila aaronii, metea, panoquin, fusca, leonardus, massasoit, phylaeus, brettus* and *pontiac.*—Philip Laurent, 31 East Mt. Airy Ave., Philadelphia, Penna.

Acronyctas wanted from all over the Continent, particularly *populi, lepusculina* and their allies. Also *Autographas*, especially *octoscripta, alias, vaccinii* and allies. Cash or exchange in Noctuidae given.—F. H. Wolley Dod, Midnapore, Alta, Canada.

For Exchange—Entomological bulletins of the various experiment stations and of the Bureau of Entomology to exchange for entomological, zoological and phytopathological publications not in my library.—C. O. Houghton, Delaware College, Newark, Del.

Wanted fertile eggs of *Catocala* for cash. I have in papers some German butterflies and moths for exchange.—Jos. N. Lang, 1433 S. 59 Ave., Cicero, Ill.

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